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ABSTRACT

Five Illinois universities, the National Center for Supercomputing Applications (NCSA), and the Illinois Area IV Learning Technology Hub are collaborating in the Preparing Educators for the 21st Century Program" (PIE-21). This state-funded program focuses on providing preservice teachers, administrators, and teacher education faculty with skills and knowledge necessary to effectively use information technology. Each project includes collaboration between a university and K-12 schools to provide preservice teachers or administrators with training and experiences to effectively use information technology in the classroom. Given that each institution is unique, each PIE-21 partner is developing and piloting a different model of integrating information technology into a teacher education or administrator preparation program. All of the institutions made strides toward their original goals; all were interested in continuing their projects into a second year of the grant. Direct benefits to the institutions through PIE-21 monthly team meetings included: exposure to current ideas about technology integration and how these ideas are implemented around the state; increased confidence locally in ideas about technology integration and K-12/university collaboration; and demonstration of technologically complex innovations in educational technology. Individual approaches are described for each of the five participating universities: Eastern Illinois University, Illinois State University, National-Louis University, Southern Illinois University-Edwardsville, and University of Illinois, Urbana-Champaign. (AEF)

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A Collaboration of Five Teacher Training Institutions: Preparing Illinois Educators for the 21st Century

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The global information technology revolution and new instructional strategies have the potential to significantly improve the learning environments of K-12 students throughout the country. Despite theses capabilities many of today's preservice and inservice K-12 teachers are not adequately prepared to utilize computing, communications, and other technologies to support teacher-facilitated technology-based learning experiences for K-12 students. *Teachers and Technology: Making the Connection*, (U.S. Congress, 1995) confirmed this by making us aware that "technology is not central to the teacher preparation experience in most colleges of education. Consequently, most new teachers graduate from teacher preparation institutions with limited knowledge of the ways technology can be used in their professional practice (p. 165)." According to the report, "Helping teachers use technology effectively may be the most important step to assuring that current and future investments in technology are realized" (p. 2). Few preservice programs are sending forth teachers prepared to use technology well as an instructional tool in their new classrooms. We know that helping teachers must continue beyond their preservice programs as well. One of the important factors in the school setting is administrative support. Lack of administrative support is most critical because it is linked to other factors that help teachers such as staff development, resources, and ongoing planning (Ritchie, 1996).

The Illinois State Board of Education (ISBE) adopted a K-12 Information Technology Plan (1996) developed by the ISBE Infrastructure Planning Team and the ISBE Technology Coalition. The Plan presents strategies for closing the gaps in technology in Illinois schools by the year 2000. Recommendation #7 in this document suggests requiring preservice teachers to demonstrate proficiency in the use of hardware, software, and related technologies to receive certification.

Calling for more technology focus in higher education, Lawrence Werner of the Illinois State Board of Education highlighted the following:

> The Office of Technology Assessment (OTA, 1995) concludes that reform of teacher education should accompany any significant reform in K-12 education. In addition, teacher education faculty and cooperating K-12 teachers must model effective instructional technology use. The OTA reports that Colleges of Education have much to learn from each other and technology can be the catalyst to make the necessary connections. Colleges, the state and K-12 schools need to work together to develop a set of shared expectations for joint reform efforts.

The PIE-21 Project

Five Illinois universities, the National Center for Supercomputing Applications (NCSA), and Illinois Area IV Learning Technology Hub are collaborating in the Preparing Educators for the 21st Century (PIE-21) program. This HECA/ISBE funded project focuses on providing preservice teachers, administrators, and teacher education faculty with the skills and knowledge necessary to effectively use

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information technology. The original grant was funded through the Higher Education Consortium and joined by the Illinois State Board of Education in support of the k-12 participants involved in the projects. Each project includes collaboration between a university and K-12 schools to provide preservice teachers or administrators with training and experiences to effectively use information technology in the classroom. NCSA participated by coordinating the project during its first year, offering technology workshop opportunities, and providing mechanisms for group communication and electronic collaboration.

Key objectives for PIE-21 include the following:

- develop models for teacher preparation that can be adopted at all Colleges of Education;
- prepare faculty, teachers, and students to effectively use information technology resources; and
- establish partnerships within local communities and educational organizations statewide.

Given that each institution is unique, each PIE-21 partner is developing and piloting a different model of integrating information technology into a teacher or administrator preparation program.

Project at Eastern Illinois University

The primary objective of the PIE21 project at Eastern Illinois University is to ensure that student teachers emerge from their college career with the skill and knowledge to be able to deal with information technology as they enter teaching careers. To accomplish this goal, learning communities have been established which involve three faculty members of EIU, four cooperating teachers, seven pre-service teachers and students in K-12 classrooms at three Professional Development Schools. Each faculty member has formed a team along with one or two cooperating teachers and 2-3 pre-service teachers. The teams interact on a level of parity with each team member being empowered equally as part of the collaborative team effort. Each team member has three roles:

1. actively engage as a learner of new technological skills,
2. serve as a mentor to assist other team members in enhancing their technological skills, and
3. serve as a mentor to their peers in disseminating new technological skills.

The teams are designing curriculum projects in three areas.

Special Education. The team is using technology to develop curricular modifications and adaptations to enhance the comprehension and writing skills of 5th and 6th grade students with learning disabilities. The students will be using the WWW to research a pre-selected topic and, using the computer, will write a paragraph about the topic. After reviewing and editing, each student's paragraph will be placed on the class home page to be shared with parents, students, and other individuals.

Middle Level Education. The team is developing a website where middle level students can post science-oriented questions. The audience who will answer the questions, may vary according to the classroom setting. Some questions may be posed for peers at the same grade level and some may be developed for younger students. The questions are designed to develop problem-solving skills using the three highest levels of Bloom's Taxonomy - analysis, synthesis, and evaluation.

Secondary English. The team is developing a website specifically focusing on American Literature and analysis of The Crucible. As research is conducted on the WWW, sites pertinent to the project will be linked to the homepage. The various analyses conducted by the students will be posted on the website and made available to other English classes at the High School. Students from an "honors" class and students from a "regular" class will be involved in the collaborative project along with their teachers and student teachers.

The PIE21 project at Eastern Illinois University is meeting with success as the teams continue to work as a collaborative learning community. Many new technology skills have been learned and the teams are anxious for the student teachers to implement the projects and share their skills with the students during their student teaching semester.

Project at Illinois State University

The Illinois State University model is based on the integration of information technology into methods classes at both the Wheeling Professional Development School (PDS) and on campus. The ISTE/NCATE recommendations are used as technology guidelines for the program.

Illinois State and the Wheeling Elementary District have developed a PDS that annually includes between thirty and forty senior elementary education majors. During the fall semester, students take methods classes delivered on-site and complete a field experience in their assigned classrooms. Spring semester they student teach in the same classrooms. A joint Illinois State/Wheeling committee planned technology workshops and attendance at a technology conference for these students. The workshops provided students experience with finding information on the Internet, communicating with Eudora, ClarisWorks, and multimedia.

The second focus of the grant is the use of the Internet collaborative environment to expand the field experience of junior elementary education majors. This collaborative environment facilitates the discussion of theory and practice focusing on the areas of language arts and classroom management. The collaborative environment currently used is netWorkPlace developed by National Center for Supercomputing Applications at the University of Illinois. It provides a visual environment for threaded discussion groups, a chat area for synchronous communications, and a library for downloads. A goal of the collaboration is for the

undergraduate students to develop an understanding of the different philosophies of teaching language arts and classroom management. Another goal is to have students use Internet technology in a meaningful way to apply what they were learning in the university classroom. This collaborative environment was used in the following two ways:

1. Off campus, Illinois State student teachers at Wheeling were connected with Illinois State University juniors on the Normal Campus who will be in the Wheeling PDS school the following year. They use this collaborative environment to discuss the application of theory that they have learned and to covey information and answer questions for the future PDS participants.

2. On campus, Illinois State students posed questions and discussed theory with teachers in the field to better prepare them for field experience and student teaching. Students in a Language Arts methods class selected topics of interest to research and developed questions in their area of interest. These questions were the beginning of a dialog between teachers in a graduate Language Arts and Technology class and the undergraduate class.

Project at National-Louis University

National-Louis University has been using the ISTE Foundation Standards as a framework to help us move toward greater integration of technology into our preservice programs. That is an ongoing effort at our institution. It is not, however, the ISTE Foundation standards or the Elementary Education program that were the focus of NLU's PIE-21 project. Our focus was the integration of technology experiences into the Educational Leadership program and identifying the knowledge and skills needed by future principals and superintendents.

The major goal was to impact the Educational Leadership curriculum in terms of technology experience for students and modeling by faculty and to build a community of principals who can learn and work together to impact the use of technology in their schools. Toward this end, our team was made up of 3 faculty members of Educational Leadership Department, 2 principals from member schools of our Professional Development School Network (PDSN), 1 student from the Educational Leadership Doctoral Program, and 1 student from Educational Leadership Masters Program. Finally the team included a facilitator and a liaison to the educational leadership faculty who was a curriculum expert.

During the course of the year, members of the group participated in a variety of experiences geared toward making them more aware of ways in which classroom teachers are currently using technology in classrooms, thus making the administrator more aware of the support and resource needs of the classroom teacher. There were also hands-on opportunities to try out software and to explore the WWW.

Other sessions involved visiting schools and having demonstrated the ways in which technology linked the principal (a member of our team) to his faculty and other administrators and inviting a panel of building and district level technology coordinators to interact with this group of faculty and administrators, present and future. This open conversation on what the panel "wished their administrators knew" had a strong impact on future group meetings. Following that panel they met to formally begin to identify the skills and knowledge about technology use that they believed administrators should have. The draft list of knowledge and skills included the following 11 items:

1. use presentation software to share ideas with an audience;
2. use concept-mapping software for brainstorming process;
3. use computer-based technology to collect, analyze and report data;
4. access and use telecommunication tools and resources for information sharing and information access. this includes the use electronic mail and web browser applications for communication and research;
5. use spreadsheets for analyzing, organizing and graphically displaying numeric data;
6. design and manipulate databases for managing school-related bodies of information;
7. use school management tools to design solutions for a specific purpose;
8. describe strategies for facilitating consideration of ethical, legal and human issues involving school purchasing and policy decisions;
9. impact of technological and societal changes on schools;
10. demonstrate knowledge of ways to assist teachers to learn to apply computers and related technologies to enhance the learning environment; and
11. describe current instructional principles, research, and appropriate assessment practices as related to the use of computers and technology resources.

Members of the PIE-21 team began to examine course content to see where these could best be implemented. During the 1997-1998 year the full Educational Leadership team will examine the implementation process.

For Educational Leadership faculty and the current principals, participation in this group was the impetus for their attendance at their first educational technology conference. The participants attended two local conferences and joined in some the pre and post sessions as well. Three of the principals attended the National Educational Computing Conference in Seattle as well. For all participants it was an awakening as they looked for more sessions applying to administrator education and expressed interest in presenting at such conferences.

During the coming year plans include the implementation of the special interest group for area principals.

Project at Southern Illinois University - Edwardsville

SIUE's now two-year involvement with the PIE-21 grant has been a growth opportunity for all six direct participants. SIUE already had a significant program for technology integration and P12-university collaboration before this grant in three areas: an experimental middle school professional development school with an on-site preservice teacher and administrator cohort, a field-based, collaborative on-campus preservice teacher education program, and a rich science education curriculum. However, the grant brought the on-campus participants into close collaboration with technology innovators statewide and, consequent to this, with each other.

Our elementary education on-campus program has two field-based semesters of methods courses followed by a semester of student teaching. Sections in Field 1 and Field 2 are block scheduled so that the cohort stays together in all of their methods sections. Eight technology integration times are scheduled over a two-semester period, and while the technology coordinator is responsible for these, a collaborative team-taught approach is used. The curriculum is web-published. ISTE Computer Literacy Standards and the new K12 State Learning Standards were used to critically redesign our curriculum, especially emphasizing hypermedia applications and internet tools in a context stressing collaborative learning, problem solving and portfolio building. This year we have focused on developing the concept of portfolio-based evaluation. Students evaluate their own progress in technology competency and integration at crucial points during the two-semester methods sequence. We are also developing a more focused liaison between the technology integration sessions in the first two field-based semesters and the university supervisors of the student teaching experience. We are hoping to institute UIUC's Technology Competencies Database in the coming semester.

The Professional Development School at North Middle School is a site-based two-year preservice program for preparing preservice teachers and administrators funded by the Danforth Foundation. The development of this curriculum has been a model of faculty-staff collaboration. For our PIE project, the most significant technology occurred because the ISTE Literacy standards were used to develop the North curriculum and students must choose to achieve proficiency for a minimum of two technology applications each quarter. The cohort has received both campus-based and on-site training in technology applications. Even more significantly, the staff has had a series of inservice workshops on technology use in the classroom followed up by focused project development periods and individualized coaching. We are seeing a synergy for technology use develop between the cohort and the North staff. Two listservs that are in active use have facilitated sharing and collaboration.

SIUE also included some non-education courses in the PIE-21 endeavor. In particular CI 341 (science methods) emphasized modeling the use of technology, required filling out the survey on the student's understanding and use of technology, required the research paper, charts, and graphs to be computer generated, introduced new technologies into the curriculum, such as using C.B.L.'s for at least one topic, with a pre and post questionnaire about using them, and developed a survey form listing the types of educational technology used during each lesson to be filled out by the instructor. For student teachers the goals were to encourage e-mail as the means of regular communication, to survey both the cooperating teacher and the student teacher on their background and access to technology, and to include as part of the Student Portfolio the Technology Standards Grid assessing the student's knowledge and exposure.

Project at College of Education, University of Illinois, Urbana-Champaign

At the College of Education at the University of Illinois, Urbana-Champaign, we have investigated two uses of technologies for improving the preparation of pre-college teachers. We have implemented and evaluated a new framework for using the Internet to bridge the pre-college and the university environments, which we call "electronic editorial assistance." Secondly we have implemented and tested an innovative way of using the Web to provide support for the accomplishment and evaluation of accomplishment of a set of technology competencies for our undergraduate teacher education students.

Electronic Editorial Assistance

We studied ways in which the World-wide Web can be used to improve preservice teacher education. One of the major strengths of the World Wide Web is that it allows a broader set of people to publish their expertise in a way that is widely accessible. In the past, we have found that publishing exemplary lesson plans developed, implemented, and evaluated by student teachers was helpful to the students, was useful for the next cohort of students (by providing exemplary models), and was widely accessed by people from around the US and across the world. However, student teachers are relative novices - it would be much more useful to publish the expertise of exemplary practicing teachers with many years of experience. However, it is difficult for those teachers to find the time, expertise and motivation to write up their own experiences so that others can benefit.

We have implemented a new framework for student learning, integrated into their student teaching classes, called "electronic editorial assistance." Undergraduate student teachers are given as a class assignment to work

with their cooperating K-12 teachers to identify a "best practice", something that the K-12 teacher has done successfully in his/her classroom that the teacher is willing to share with other teachers. The student teacher writes up the "best practice", shows it to the cooperating teacher for corrections and extensions, and their work together to develop a finished write-up. The write-ups are submitted as a class assignment and graded by supervising university faculty. These "best practices" are then published on the Web, with the K-12 teacher as author and the student teacher as editor. The best of these "best practices" are featured on the web, but all of the best practices are available so that others can make their own judgments.

We have implemented and evaluated this framework during the 1996-1997 academic year with students in a secondary mathematics student teaching program and with students in a general secondary education student teaching program at the University of Illinois. The response to this framework from student teachers, K-12 teachers, and university faculty has been very positive. The published "best practices" have been accessed by a very widely distributed set of people from across the US and around the world. We are planning to work cooperatively with faculty at other teacher preparation institutions to implement this Electronic Editorial Assistance framework more broadly during the 1997-1998 academic year.

Technology Competencies Matrix

New learning environments provided by technology, such as the electronic editorial assistance framework, require alternative assessment of student learning. We have explored ways in which the World-wide Web can support a more richly collaborative evaluation, through a web-mediated database for communication between students and university faculty. In this computer-supported collaborative evaluation, students can see the current state of their accomplishment, can submit evidence of accomplishing a specific competency, can receive feedback from faculty, and can modify and augment their evidence until they have demonstrated competency. For faculty, this mechanism provides an easy way to see where students are, to receive and evaluate students' evidence of accomplishment, and to engage in a productive interaction to help support the students learning through evaluation. It also is a continually updated source of information for students and faculty, providing access to instances of successful accomplishment.

We have implemented this Technology Competency Matrix (TCM) during the 1996-1997 academic year, and have tested it during the Spring semester of 1997 with twelve students in an elementary education student teaching program at the University of Illinois. Students were motivated to use the TCM because it provided them with an electronic portfolio demonstrating their technology competency that they could use as part of their job search. The portfolio was available world-wide to prospective employers through the Internet. In addition, students printed out the relevant web pages and used them as a print-based portfolio demonstrating their portfolio for job interviews with schools that did not have easy access to the Web. The main drawbacks discovered during this initial use was the slowness of the system under load, issues of interpretation of the technology competencies (the first ISTE/NCATE Technology Competencies for Teacher Education Students), and the fact that the system was introduced so late in their academic year. During the summer of 1997, we have worked to speed up the system and to incorporate the revised ISTE/NCATE Technology Competencies, and during the fall of 1997 we plan to use the TCM with an entire cohort of elementary education student teachers for the whole academic year.

Conclusions

Each of the participating institutions made strides toward their original goals. All were interested in continuing their projects into a second year of the grant. Table 1 summarizes each of the models implemented as part of the PIE-21 program, identifies key characteristics, and describes the transfer of technology.

There were direct benefits to each of the institutions through the PIE-21 monthly team meetings. These included 1) an exposure to current ideas about technology integration and how these ideas were being implemented in different ways around the state, 2) a consequent increased confidence locally in what were and were not fruitful avenues of technology integration and K12/university collaboration, and 3) a demonstration of some of the more technologically complex innovations in educational technology being developed at NCSA/UIUC. Another unanticipated benefit was that one of the grant participants had worked extensively on a model for using the ISTE Foundation Standards as a basis for integrating technology into the college curriculum.

Important developments at individual Colleges of Education have been shared with the other PIE-21 colleges and are in the process of being disseminated statewide. Four products have been developed that will be of use to any organization concerned with the education of teachers and administrators. There has been development of strong partnerships among the collaborating institutions with a real and positive synergy generated by this project. It has added impetus to the individual reform efforts in the teacher-training curriculum at each of the sites while at the same time all groups work together toward the same goals. At each monthly meeting, participants left having learned something about integrating technology into their teacher preparation program. Each of the models has demonstrated the importance of involving all stakeholders in the process of integrating technology into teacher and administrator preparation programs. That is, cooperating teachers, college

faculty, administrators (at both the college and K-12 level) and the students, all need to "buy into" the importance of technology in the classroom and school.

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